

**REMARKS**

Claims 1 and 3-20 are pending.

In paragraph No. 2 of the Action, Claims 1 and 3-20 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Ichikawa et al (US 6,265,479).

Applicant submits that this rejection should be withdrawn because Ichikawa et al does not disclose or render obvious the presently claimed natural rubber.

In order to demonstrate the unexpectedly superior effects provided by the combination of the increase of total nitrogen content from not more than 0.10% to not less than 0.12% and the deproteinizing treatment without separation of non-rubber components in a process for producing a natural rubber, Mr. Hajime Kondou, the sole inventor of the present invention, submits herewith an executed Declaration under 37 C.F.R. § 1.132.

In his Declaration, Mr. Kondou conducted additional experiments (Preparation Examples 13 and 14, Examples 14 and Comparative Example 16) and reviewed Examples and Comparative Examples shown in Tables 1, 3, 7 and 9 of the specification, which were also presented at pages 5-7 of the Declaration.

The rubber composition of Example 14 is prepared from a natural rubber with a total nitrogen content of 0.122%. The rubber composition of Comparative Example 16 is prepared from a natural rubber with a total nitrogen content of 0.096%.

As shown in Tables A and B at pages 3 and 4 of the Declaration, the combination of the increase of the total nitrogen content from 0.096% to 0.122% and the deproteinizing treatment without separation of non-rubber components in a process for producing a natural rubber

provides the unexpectedly superior effects of the much higher tensile strength, the much lower hysteresis loss property ( $\tan \delta$ ) and the much better aging resistance.

Applicant believes that he found for the first time that the physical properties of rubber compositions are improved by leaving an appropriate amount of non-rubber components and adjusting the total nitrogen content in a natural rubber.

Further, Applicant reviewed Examples and Comparative Examples shown in Tables 1, 3, 7 and 9 of the specification.

In comparisons between the prepared natural rubbers a and e in Table 1 at page 5 of the Declaration and between Example 1 and Example 4 in Table 3 at page 6 of the Declaration, both of the rubber compositions Example 1 and Example 4 have almost the same total nitrogen content (%) (0.16% and 0.17%, respectively). However, the rubber composition Example 1 achieved much higher tensile strength and much more improved aging resistance than those of the rubber composition Example 4, because the prepared natural rubber a employed in Example 1 did not separate non-rubber components by centrifugation after deproteinization.

Similarly, the rubber composition Example 8 having the prepared natural rubber h achieved much better resistance to belt edge separation, much higher adhesion of rubber and steel after driving and much higher retention of elongation at break of rubber than those of the rubber composition Example 10 having the prepared natural rubber k in Tables 7 and 9 at page 7 of the Declaration.

These results show that the deproteinizing treatment without separation of non-rubber components in a process for producing a natural rubber provides unexpectedly superior effects of the physical properties of natural rubber compositions.

It is clearly shown from the results of the Experiments in the Declaration that not only the deproteinizing treatment without separation of non-rubber components but also the combination of an appropriate amount of total nitrogen content and the deproteinizing treatment without separation of non-rubber components provide unexpectedly superior effects on the physical properties of natural rubber compositions.

Ichikawa et al do not teach or suggest the unexpectedly superior effects provided by the present invention.

In view of the above, reconsideration and withdrawal of the §103(a) rejection based on Ichikawa et al are respectfully requested.

Allowance is respectfully requested. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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**23373**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Hajime KONDOU

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For : NATURAL RUBBER, RUBBER COMPOSITION AND PNEUMATIC  
TIRE

Art Unit & Examiner : 1796, Mr. Peter D. Mulcahy

DECLARATION UNDER 37 CFR 1.132

ASSISTANT COMMISSIONER FOR PATENTS

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Sir:

I, Hajime KONDOU, in care of 3-1-1, Ogawahigashi-cho Kodaira-shi, Tokyo, Japan, declare that:

1. I graduated from Nagoya University with a Bachelor's degree in School of Engineering, Department of Synthetic Chemistry in March 1991, and joined BRIDGESTONE CORPORATION in April 1991. Then, I have been engaged in the research and development of tire materials including development of synthetic rubbers and natural rubbers in Material-Development up to the present.

2. I am the sole inventor of the present U.S. Patent Application as identified above and familiar with the subject matter disclosed in the application.

### 3. Experiment

#### Object of Experiment

In order to clarify the excellent effects resulting from the combination of the increase of total nitrogen content from not more than 0.10% to not less than 0.12% and the deproteinizing treatment without separation of non-rubber components in a process for producing a natural rubber, the following experiments were conducted.

In addition thereto, Examples and Comparative Examples shown in Tables 1, 3, 7 and 9 in the specification of this invention were reviewed.

#### Procedure of the Experiment

Additional Preparation Examples 13 and 14, Additional Examples 14 and Additional Comparative Examples 16 were carried out.

(1) Additional Preparation Examples 13 was conducted in the same process as Preparation Example 1 described in the specification of this invention except for 10 hr of the treatment time and then the natural rubber m of this invention was obtained. The other hand, Additional Preparation Examples 14 was conducted in the same process as Preparation Example 5 described in the specification of this invention except for 0.04 g of the added protease and 4 hr of the treatment time and then the natural rubber n as a comparative example was obtained..

The total nitrogen content in the natural rubbers, the Mooney viscosity (ML<sub>1+4</sub>, 100°C) and the stress relaxation time of natural rubbers m and n obtained in Additional Preparation Examples 13 and 14, respectively, were measured in the same test methods as described in the specification. The results are shown in Table A.

(2) Using the natural rubbers m and n, two rubber compositions were prepared by mixing the components in accordance with the conventional process and the formulation shown in Table 2 described in the specification. The Mooney viscosity (ML<sub>1+4</sub>, 130°C) of the prepared rubber compositions of Additional Example 14 and

Additional Comparative Example 16 was measured. The two rubber compositions were vulcanized under the condition of 145°C and 33 minutes and the physical properties of the two vulcanized rubber compositions were measured in the same test methods as described in the specification. The results are shown in Table B.

#### 4. Result

The results obtained are shown in the following Table A and B.

Table A

Prepared natural rubber	m	n
Additional Preparation Example	13	14
Conditions of deproteinization		
enzyme		
type	protease	protease
amount	0.06 g	0.06 g
alkali		
type	-	-
amount	-	-
time of treatment	10 hr	4 hr
Centrifugation after deproteinization	none	conducted
Mooney viscosity (ML1+4, 100°C)	62	58
Stress relaxation time (T <sub>80</sub> , sec)	23.5	22.0
Total nitrogen content (%)	0.122	0.096

Table B  
Evaluation of rubber composition

Additional Example	14	
Additional Comparative Example		16
Prepared natural rubber	m	n
amount (part by weight)	100	100
IR2200 (part by weight)	0	0

Mooney viscosity (ML1+4, 130°C)	63	59
Tensile strength Tb (MPa)	27.3	25.1
tan $\delta$	0.161	0.168
Resistance to heat aging (index)	51	34

#### 5. Consideration on the results shown in Tables A and B

The combination of the increase of the total nitrogen content from 0.096% to 0.122% and the deproteinizing treatment without separation of non-rubber components in a process for producing a natural rubber achieved the excellent effects of the much higher tensile strength, the much lower hysteresis loss property (tan  $\delta$ ) and the much better aging resistance.

I found for the first time ever that the physical properties of rubber compositions are improved by leaving an appropriate amount of non-rubber components and adjusting the total nitrogen content in a natural rubber.

6. Review of the Examples and Comparative Examples in the specification

The following are Tables 1, 3, 7 and 9 in the specification of this invention.

Table 1 - 1

Prepared natural rubber (Preparation Example)	a (1)	b (2)	c (3)
Conditions of deproteinization enzyme			
type	protease	peptidase	-
amount	0.06 g	0.06 g	-
alkali			
type	-	-	NaOH
amount	-	-	0.06 g
time of treatment	5 hr	5 hr	5 hr
Centrifugation after deproteinization	none	none	none
Mooney viscosity (ML1+4, 100°C)	65	66	64
Stress relaxation time (T <sub>80</sub> , sec)	25.5	29.0	24.5
Total nitrogen content (%)	0.16	0.19	0.18

Table 1 - 2

Prepared natural rubber (Preparation Example)	d (4)	e (5)	f (6)	g (7)
Conditions of deproteinization enzyme				
type	protease	protease	protease	-
amount	0.9 g	0.04 g	0.03 g	-
alkali				
type	-	-	-	-
amount	-	-	-	-
time of treatment	8 hr	5 hr	2 hr	-
Centrifugation after deproteinization	none	conducted	none	none
Mooney viscosity (ML1+4, 100°C)	52	67	71	73
Stress relaxation time (T <sub>80</sub> , sec)	16.0	31.0	46.0	62.5
Total nitrogen content (%)	0.055	0.17	0.36	0.47



Table 3 - 1  
Evaluation of rubber composition

Example	1	2	3	
Comparative Example				1
Prepared natural rubber				
type	a	b	c	d
amount (part by weight)	100	100	100	100
IR2200 (part by weight)	0	0	0	0
Mooney viscosity (ML1+4, 130°C)	65	66	66	61
Tensile strength Tb (MPa)	27.4	27.2	26.7	23.9
tan $\delta$	0.162	0.164	0.163	0.196
Resistance to heat aging (index)	52	51	48	43

Table 3 - 2  
Evaluation of rubber composition

Example	4				
Comparative Example		2	3	4	5
Prepared natural rubber					
type	e	f	g	g (masti- cated)	g
amount (part by weight)	100	100	100	100	75
IR2200 (part by weight)	0	0	0	0	25
Mooney viscosity (ML1+4, 130°C)	66	75	76	69	73
Tensile strength Tb (MPa)	26.9	26.4	26.2	26.6	25.3
tan $\delta$	0.161	0.174	0.176	0.171	0.182
Resistance to heat aging (index)	37	49	48	47	37

Table 7

Prepared natural rubber	h	i	j	k	L
Preparation Example	8	9	10	11	12
Enzyme of deprotein- ization					
type	protease	peptidase	protease	protease	-
amount	0.06 g	0.06 g	0.9 g	0.04 g	-
Time of deproteinization	5 hr	5 hr	8 hr	5 hr	-
Centrifugation after deproteinization	none	none	none	conducted	none
Mooney viscosity (ML1+4, 100°C)	65	66	52	67	73
Total nitrogen content (%)	0.16	0.19	0.055	0.17	0.47

Table 9  
Evaluation of tire case member

Example	8	9	10	
Comparative Example			12	13
Natural rubber obtained in Preparation example	h	i	j	k L
Resistance to belt edge separation (index)	116	114	102	109 100
Adhesion of rubber and steel after driving	A	A	B	B B
Retention of elongation at break of rubber (%)	65	63	53	45 59

7. Consideration on the results shown in Tables 1, 3, 7 and 9 in the specification of this invention.

In comparisons between the prepared natural rubbers a and e in Table 1 and between Example 1 and Example 4 in Table 3, both of the rubber compositions Example 1 and Example 4 have almost the same total nitrogen content (%) but the

rubber composition Example 1 achieved much higher tensile strength and much more improved aging resistance than those of the rubber composition Example 4.

Further, the rubber composition Example 8 having the prepared natural rubber h achieved much better resistance to belt edge separation, much higher adhesion of rubber and steel after driving and much higher retention of elongation at break of rubber than those of the rubber composition Example 10 having the prepared natural rubber k in Tables 7 and 9.

These results show that the deproteinizing treatment without separation of non-rubber components in a process for producing a natural rubber achieved the excellent effects of the physical properties of natural rubber compositions.

#### 8. Conclusion

It is clearly recognized from the results of the above Experiments that not only the deproteinizing treatment without separation of non-rubber components but also the combination of an appropriate amount of total nitrogen content and the deproteinizing treatment without separation of non-rubber components achieve unexpected excellent effects on the physical properties of natural rubber compositions.

9. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

February 19, 2008

Date

Hajime Kondou

Hajime KONDOU